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From Artifact to Tool: Teachers' Collective Agency in School Reform

Abstract

This study examines the mutual development of person and collective in the enactment of instructional reform through professional collaboration. The research uses sociocultural perspectives to frame the connection among person and collective in terms of the emergence of collective agency. Teachers' collective agency comprises collaborative action that transforms institutionally-defined artifacts into collectively-derived tools for teaching practice. Data include a detailed transcript of a 39-minute sequence pivotal to the enactment of reform principles by teaching staff in a US public secondary school. The analysis, which draws on views of language and semiotic mediation that complement sociocultural perspectives, traces one interactive move in the realignment of social relations in the collective that contributed to the uptake and transformation of an artifact introduced as part of the reform initiative. Findings of the study provide a dynamic view of the development of collective agency as specific alignments among person, collective, and institution in the enactment of reform. Implications for practice include highlighting conditions and patterns of interaction conducive to the mutual adaptation of institutionally-derived forms and collectively-mediated actions. The study contributes a novel approach to illuminating the institutional dynamics of educational change in the everyday interactions that constitute professional work in schools.

Introduction

The purpose of the study reported in this article is, broadly, to explain the development of collective agency through a close analysis of a key instance of professional collaboration. The analysis hinges on one critical sequence of interaction in Lincoln-Gateway High School, a public secondary school in an ethnically and socially-mixed community that borders a Midwestern city

in the United States. Several years of faltering starts at a comprehensive overhaul of teaching and learning had led Lincoln-Gateway to a precipice. The school was at risk of losing its accreditation, having received a formal warning that the state might take control of the school due to its failures to improve instruction. The crux of the critique was the unevenness of teaching quality overall and, in particular, inattention to racial and ethnic disparities in attainment. School leaders developed a plan for reform that would offer the faculty, “a common language across grade levels and subjects for thinking through, discussing, and articulating curriculum choices and documents.”¹ Those directly responsible for moving adoption forward were the school’s cohort of subject teacher-leaders who worked with subject-based teams of teachers to promote “a common language” through the collaborative development of curriculum.

The general profile of reform assumed by Lincoln-Gateway is by no means unique. Over the past four decades, efforts to improve the quality of teaching and learning on a broad scale in schools have taken the development of the collective agency of teachers as central (Berman & McLaughlin, 1975; Levin, 2010). Research, policy, and practice continue to struggle with deriving appropriate equations for bringing instructional reform to scale, with the promotion of collective agency of teachers taken as a crucial term in these equations. Collective agency, in these discussions, tends to be viewed either as the development of local practice through collective knowledge building within the school, an adaptive approach, or the standardization of practice through the mastery of specific technical skills introduced from outside the school, a programmed approach (Berman, 1980; Rowan, 1990). Recent studies of the enactment of reform highlight a third approach, that of “professional controls” (Rowan, Correnti, Miller, & Camburn, 2009; Rowan & Miller, 2007) or “distinguishers” (McDonald, Klein, & Riordan, 2009) that combines the selective identification of key instructional principles introduced from the outside with the cultivation of strong local leadership and mentoring within the school.

The normative orientations to collective agency of these three approaches—programmed, adaptive, and professional—assume an interconnection between organizing strategy and the processes of developing agency through the collective. The study reported here takes a microanalytic approach to the articulation of that process through close examination of one sequence of collaborative interaction. A team of two teacher-leaders and a junior teacher at Lincoln-Gateway collaborated on the development of a tool for curriculum design that captured for their colleagues and for the leaders of the reform initiative an archetype of the “common language” they sought (Eddy Spicer, 2006). This one product of collaboration came to stand as a tangible connection between the organizing strategy adopted by school leaders, the pedagogical frameworks espoused by the reform initiative, and the approach to instruction enacted by teachers. In this way, the interaction and its result successfully navigated the persons, the collective setting and the institutionally-defined conditions under which persons and collective operated. This study explores the sequence of interaction in which the tool for curriculum design was created.

To trace the development of collective agency, the study approaches professional collaboration from a sociocultural perspective, taking the collective as the primary unit of analysis and approaching professional collaboration as acting through language and with institutionally-defined artifacts (Daniels, 2008; Leont'ev, 1978; Wells, 1999; Wertsch & Rupert, 1993). Specifically, the enactment of reform is explored as a process of semiotic mediation (Hasan & Webster, 2005; Lemke, 2003), in which the language the teachers use to communicate with one another and the representational artifacts they take up in their work together comprise semiotic formations that are conditioned by the mutual interaction among persons, the social world of the collective, and the historical and cultural contexts of the institutions that legitimate that social world. By tracing shifts in semiotic formations of interaction and action with representational artifacts, the study provides a theoretically-informed explanation of how

teachers take up artifacts that have been introduced as part of a school-wide reform initiative and come to make them their own in the process of their joint inquiry.

Methods and Data Sources

Setting

“Lincoln-Gateway High School” is the pseudonym for the sole public secondary school in the “Gateway School District,” a community on the urban fringe of a major city in the upper Midwest of the United States. The secondary school serves an ethnically and socially diverse body of 1,800 students with a teaching faculty and administrative staff of 200. From 2000 to 2006, the high school had four principals and was in its third year of a major restructuring effort at the start of data collection (December, 2004). A central aspect of this reform involved preparing teachers for the introduction of block scheduling, in which students attended fewer classes per day for longer periods of time, offering the possibility for deeper and more creative exploration of subjects. To help teachers across the school take optimal advantage of block scheduling, school leaders launched a broad professional development effort to cultivate a “common language” around teaching and learning. The vocabulary for that common language derived from two general pedagogical frameworks for developing curriculum and teaching, Teaching for Understanding or TfU (Blythe, 1998; Wiske, 1998; Wiske & Perkins, 2005) and Differentiated Instruction (Hall, 2002; Tomlinson, 1999), both of which aimed to help teachers improve subject matter teaching in the service of deepening student learning while addressing the gamut of students’ academic abilities.

Professional development around these frameworks was led by an existing cadre of subject-based teacher-leaders. Teacher-leader in this school was an official designation that carried responsibilities for convening and facilitating subject-based groups of teachers, primarily for teaching support and curriculum development, as well as mentoring junior teachers, without direct responsibility for the evaluation of those teachers. The reform initiative gave teacher-

leaders the responsibility of shepherding the proposed shifts in curriculum development and instruction with their teacher groups. In preparation for this group work, teacher-leaders themselves were expected to work together to become familiar with the general pedagogical frameworks.

The immediate setting of this study is an online course for the teacher-leaders that focused on lesson planning with both Teaching for Understanding and Differentiated Instruction. The course was offered at a distance through the school of education of a nationally-recognized university and led by an educator who had international experience in helping teachers apply the frameworks in their teaching. The course consisted of nine biweekly sessions that ran from 15th February to 12th May, 2005. School-based teams of collaborating teachers taking part in the course were expected to meet face-to-face once a week to work through specific activities assigned for each session. The session activities aimed to support each team in its efforts to design collaboratively a new unit of curriculum that embodied the principles of the two approaches. The team followed in this study were the only participants from their school at that time.

Participants and data collected

The analysis reported here draws from the interaction of the team in one of the eleven meetings held during the running of the online course. The team consisted of Helen, the high school physics teacher-leader; Mary, the biology teacher-leader; and Ana, a second-year teacher who taught both physics and biology. Ana, the junior teacher, volunteered to join the team because the course offered her a way of gaining master's-level credit for free. Helen had studied Teaching for Understanding as a master's student and had used the approach in her own teaching; however she was not familiar with the approach to Differentiated Instruction advocated in the online course. Mary and Ana had no direct experience with either framework. Throughout the online course, the team had been developing a biology unit on energy, derived

from an existing biology unit both Mary and Ana had taught. The unit, revised to reflect principles drawn from both frameworks, included content that built on students' knowledge of physics, Helen's subject area.

The primary data for this study are verbatim transcripts of audio recordings recorded by the team. The team met in the classroom of the physics teacher-leader, Helen, each Wednesday around mid-day, with each meeting lasting about an hour (11 sessions averaging 1 hour, recorded only). Complementing transcripts of the team's meetings, each member of the team was interviewed individually at the beginning, middle and end of the course. Each team member had opportunities to comment on the transcripts from their individual interviews. After the completion of individual interviews, the team members took part in a group interview to discuss preliminary analysis and initial findings. Team members subsequently received a summary draft of the detailed analysis of team interaction reported here, and their comments were incorporated into revisions. This study is also informed by data from observations of these teachers in other settings conducted as part of a larger study of teacher interaction in the midst of reform (Eddy Spicer, 2006).

Sampled event

The analysis examines in detail one 39-minute sequence drawn from the tenth meeting of the team on 26 April 2005. In this, the team's penultimate meeting, the teachers prepare to submit a summary of their work on the energy unit that they have been developing throughout the online course. The web-based preparatory materials for this session offer a template for summarizing their work—a graphic organizer labeled the “TfU Planning Frame” (Figure 1). The primary focus of their discussion in this tenth team meeting has to do with the assessment of student learning in ways that address the diversity of activities they have planned to cultivate students' understanding of energy.

The sequence of interaction analyzed here serves as a critical case (Patton, 2002) for several reasons. The transformed planning frame that resulted from the team interaction in this meeting came to be taken up as an exemplar of the new approach to lesson planning intended by the school's reforms. Mary and Helen, along with other teacher-leaders, used the revised planning frame specifically, and the energy unit generally, as a model of curriculum revision for groups of teachers to emulate in the school. The leader of the online course also made use of the unit as an exemplar in subsequent offerings of the course. Finally, the two teacher-leaders and the junior teacher, independently and collectively in interviews, identified the team session analyzed here as the most helpful in terms of their making use of the principles of the frameworks as part of their own teaching practice.

Discourse analysis

The above serves as external validation for selecting the interaction and artifacts in the tenth meeting as worthy of intensive study. Additional validation derives from a close analysis of team interaction. The 39-minute sequence had the highest number of a particular interactive move that previous research based on a wider corpus identified as crucial to collaborative work, defined as a tracking-through-probing or "tracking/probing" move (Eddy Spicer, 2011). The analysis of interaction used here distinguishes a rank scale of hierarchically-organized discourse units, with sequences encompassing exchanges, which in turn encompass moves. The analysis uses the unit of move as the primary unit (Eddy Spicer, 2011). Names for moves are adapted from speech function labels elaborated in Eggins & Slade (1997, see in particular pp. 169-226) and Eggins (2004, pp. 141-187), which build on Martin's (1992) considerations of meaning making through dialogue (pp. 31-91) and Eggins' (1990) studies of casual conversation.²

The interactive move labeled tracking/probing tags a move in which the speaker introduces further details or teases out implications of an immediately prior turn of another. The category of "tracking" refers in general to confirmation of another's ideas and encompasses four

sub-types: checking, confirming, clarifying, and probing.³ These are arrayed in terms of the potential of opening up the interaction to the development of meaning in a non-confrontational manner, ranging from simply requesting repetition of a misheard element in checking to the active development of another's ideas through probing. Probing, in contrast with the preceding subtype clarifying, refers to the introduction of something new, the speaker's own incremental elaboration of what the previous speaker has said, which introduces the potential of shifting the conversation in a slightly different direction. Tracking/probing stops short of a direct challenge and is grammatically marked as a question or a statement with an implied question that is meant to sustain the elaboration through interaction, not prove a point, as a confrontational move might suggest. This detailed examination of one extended interaction explores how the tracking/probing move operates in interaction together with the use of the planning frame and other artifacts.

Conceptual Framework

Collaborative inquiry and school reform

The collective development of practice through joint reflective inquiry has been viewed as a central element of teacher learning and progressive educational reform for more than three decades (Grossman, 1992; Little, 1982; McLaughlin & Talbert, 2001; Penuel, et al., 2010; Shulman, 1987). The link between the person and the collective has long been the focus of research on teachers' collaboration (D. L. Ball & Cohen, 1999; Lord, 1994; Wilson & Berne, 1999). Characterizations of collective learning in well-functioning teacher teams have been a central feature of this research (Drago-Severson, 2007; Little & McLaughlin, 1993).

The rise of comprehensive instructional reform and the importance of teachers' collective agency as an aspect of the enactment of reform has drawn attention more recently to the link between the collective and the institutional planes. Early studies of educational change (Berman & McLaughlin, 1975) characterized four possible types of enactment: rejection, in

which no change occurs; minimal compliance, what might be termed “going through the motions” without engagement; cooptation, in which the aims and means of reform bend to fit existing conditions without substantive change; and mutual adaptation, in which the aims and means of reform interact with existing conditions in constructive ways that bring about generative shifts in practice (p. 10). Research over the past quarter century has helped expand understanding of the characteristics of healthy professional communities that contribute to mutual adaptation (Goddard, Goddard, & Tschannen-Moran, 2007; Grossman, Wineburg, & Woolworth, 2001; Little, Horn, & Bartlett, 1999; McLaughlin & Talbert, 2001; Woods, Levačić, Evans, & Castle, 2007). Researchers have also characterized how strong groups within a school shape enactment of reform through the development of distinct subcultures (S. J. Ball & Lacey, 1984); how in high schools those subcultures cluster most significantly at the level of subject-matter departments (Siskin, 1994); and how participation in such communities may have pronounced effects on school-wide reform (Hargreaves, 2003; Horn, 2002; Lieberman & Miller, 2001). These connections emphasize the ways in which attempts to shift traditions of institutionalized practice hinge on agency at the collective level.

Collective agency and semiotic mediation

The current study draws on sociocultural theory broadly and the notion of semiotic mediation, more precisely, to highlight the development of collective agency in the enactment of reform. In terms derived from the elaboration of sociocultural theory by Wertsch (1998), agency is person-acting-with-mediational-means and comprises two essential qualities, “know how” and “making one’s own” (pp. 46-58). Knowing how, adopted from the work of Ryle (1956), denotes ability to use available means, such as language and tools, towards particular ends. For teachers collaborating in the midst of instructional reform, “knowing how” entails taking actions with language to develop mastery in the use of a wide range of tools, not only material tools such as timetables and graphic organizers, but also conceptual tools, such as pedagogical principles and

protocols for collaboration. Sociocultural perspectives highlight another dimension of collective agency when collaboration is harnessed to school-wide reform. That dimension involves engagement with reform as “making one’s own” or appropriation, a term Wertsch borrows from the writings of Bakhtin (1981). The characterizations of enactment presented earlier can be viewed through the bifocal lens of agency using the dimensions of mastery and appropriation. Rejection entails neither mastery nor appropriation. Minimal compliance involves a modicum of mastery with no appropriation. Cooptation, on the other hand, offers the opposite, “making one’s own” without mastery. Finally, mutual adaptation entails both “know how” and appropriation in transforming espoused reform into enacted practice.

Edwards (2005) emphasizes the interpersonal dimension of mutual adaptation in the notion of relational agency, which acknowledges the primacy of social relationships for acting in professional settings, “knowing how to know who”, as she describes (p. 178). These three aspects of mastery, appropriation, and relational agency are essential to collective agency. As used in this study, collective agency aligns with Wertsch’s (1998) notion of person-acting-with-mediational means and Edwards’ (2005) elaboration of person-acting-with-others, but differs from these in its emphasis on institutional dimensions that condition available channels for action. These channels shape the ways in which collective agency takes up institutionally-defined artifacts and puts these into use (or not) as collectively-derived tools.

In sociocultural terms, what is taken as institution relates, in part, to moral order, with moral in the sense of the socially-valued, culturally and historically derived systems of practice that legitimate action (Daniels, 2008, pp. 148-155). The institutional manifests in everyday interaction as specialized categories (Mäkitalo & Säljö, 2002) and traditions of practice (Hedegaard, 2001). In terms of this study, and the enactment of reform more broadly, different vectors of institutional conditions intervene. In the institution of schooling, teachers enact institutionalized roles within the school, such as teacher-leader or junior teacher, and their relationships are conditioned by disciplinary and professional boundaries in the intersecting

institution of the profession of teaching, such as traditions of practice in the teaching of biology versus physics or historically-defined disciplinary boundaries (e.g., knowledge of the principles of biology and physics) and notions of pedagogical expertise (e.g., inquiry science teaching). The reform discussed in this study, as do most instances of reform, presents a third institutional category, which might be labeled generally as institutionalized expertise from outside the school, represented through the categories that are recontextualised (Bernstein, 1999) within the institutions of schooling and the profession of teaching in the enactment of reform. In this case, the institution is that of academia, presented in the general pedagogical frameworks adopted as part of the reform initiative, which are represented in the artifacts used in the online course.

The collective, from this perspective, serves as the point at which these various institutional conditions intersect. An analytic perspective on this pivot that aligns with the sociocultural views presented above is that of semiotic mediation (Hasan & Webster, 2005; Lemke, 2000; Valsiner, 2001; Wells, 2007). Semiotic mediation provides a way to explore socially significant **doing** the ways in which, “we make sense to and of others, not merely in explicit communication, but through all forms of socially meaningful action (speaking, drawing, dressing, cooking, building, fighting etc.)” (Lemke, 1995, p. 102). The collective comprises a primary setting in which meaning is made about socially-valued traditions of practice—institutionalized orders of meaning—through semiotic mediation. Semiotic mediation through language and the use of material and representational tools are the means through which the development of collective agency occurs.

Valsiner (1997, pp. 304-308) proposes a laminal model of the process of semiotic mediation that includes five possible layers through which institutionalized orders of meaning intersect with personal meaning. These include attention; evaluation; interpolation with existing orders of meaning; transformation; and integration with transformed orders of meaning. At each layer the uptake of what is outside confronts a buffer, a process of “back-and-forth constraining” (Lawrence & Valsiner, 2003, p. 725), between person and social world, that both

resists and transforms what is taken up in selective ways. The process is not straightforward but entails the negotiation at each layer of filters and buffers that present the possibility of a wide variety of outcomes which include rejection, minimal compliance, cooptation, or mutual adaptation, using the terms from Berman & McLaughlin (1975) noted earlier. The analysis below uses four labels from this model—attention, interpolation, transformation, and integration—as a heuristic to articulate layers in the alignment of persons, collective and institution in the transformation of institutionally-derived forms into collectively mediated actions.

Findings

The findings below follow the interconnection of discursive moves and transformations of the artifact to trace the development of collective agency. The principal claim made in the following is that the transformation of the planning frame into a tool for the use of the team corresponds with transformations in the social positions of those in the team. These transformations of both institutionally-defined social position and institutionally-defined artifact occur as a result of particular alignments of persons, collective and institution. This claim rests on an analysis of the role of moves labeled tracking/probing as a ligature in the development of collective agency in the group. The moments of interaction in which tracking/probing moves are most in use correspond with those moments that involved qualitative transformations in the artifact as well as qualitative transformations in social relations among group members. These transformations, supported by the subsequent knowledge of generative outcomes that resulted, provide evidence for the joint development of mastery in the use of the principles as well as appropriation (“making one’s own”) of their use that corresponds with the definition of collective agency used here.

As described earlier, the interaction of the team during this sequence revolves around how to represent the considerable work they had already done within the constraints of the graphic organizer, the “TfU Planning Frame”, which they were given to distill their work. The

team members were particularly concerned about accurately representing the connections with framework principles they had developed in previous sessions between various learning activities for the unit and different forms of assessment (e.g., student self-reflection, peer feedback, teacher feedback).

Findings are given below in two sections; the first is a brief summary of what happened to the primary artifact, the TfU Planning Frame, by the end of the team meeting. The second section highlights four key moments of interaction among team members and between the teachers and the artifacts they were using. The focus of the analysis in the second section is on the role of tracking/probing moves in the interaction of team members.

Primary artifact

The team made use of several representational artifacts in their work together, all of which were introduced as part of the online course activities. The two artifacts to which the team refers most frequently are the “Feedback Pyramid” and the “TfU Planning Frame” (Figure 2). The team first used the Feedback Pyramid as part of their course activities in a prior session, during which it was introduced to assist with the selection of appropriate forms of assessment for different learning activities. The TfU Planning Frame, as mentioned earlier, is the primary artifact for the current session. The planning frame appears markedly different at the end of the meeting than it does at the beginning. At the beginning of the meeting, the planning frame depicts a larger rectangle divided into five sections or frames—four trapezoids arrayed around a central rectangle. The team first sees the planning frame as a postage-stamp-sized graphic on a web page (Figure 1) and then as a document on the screen (Figure 2) and then on the printed page. Each of the frames bears a label that corresponds with an aspect of the design of their unit that they have addressed in earlier sessions. The text accompanying the planning frame details how they are to summarize the work they have done in previous sessions to complete the planning frame for this session. By the end of the meeting, the teachers have broken down the

border separating two of the five frames and have put in a staircase which leads up to a large graphic of a sun (Figure 3). They have altered the section headings as well. Below, I discuss these material transformations and their implications for the transformation of teachers' ideas about their planned unit as well as transformations in the social relations among the teachers.

Structuring discourse/restructuring artifact

The social relations among group members change markedly from the beginning to the end of the meeting, with the junior teacher taking a much more active role at the end. The findings below detail the teachers' interactions over the course of their meeting, with a particular emphasis on the role of the tracking/probing moves in selected excerpts. Four of the labels from Valsiner's (1997, pp. 304-308) laminal model of semiotic mediation—attention, interpolation, transformation, and integration—characterize stages in the development of collective agency.

Attention

The teachers' first reference to the planning frame comes in the seventh exchange of the 46 that comprise the sequence. Exchange 7 is among the longest, lasting for 4 minutes of the overall 39 minutes. In this exchange, the team shifts quickly from attending to multiple material representations of the artifact (e.g., the icon on the web page, the document open on a computer screen, a printed page) to evaluating one particular version that they have decided is authoritative. The teachers have put their papers on a lab bench in Helen's classroom. At the beginning of the exchange, they are gathered around Helen's computer and printer at the back of the classroom. Helen is at the keyboard, printing out documents from the current session as well as from their previous work. Mary is looking over Helen's shoulder at the screen, and Ana is taking the printed pages back to the bench where they will be working. By the end of this excerpt, all three are back at the lab bench. Much of the interaction occurs as they are either physically holding, pointing to or looking at different documents. A key source of their confusion in the following excerpt from exchange 7 is the fact that the icon for the planning

frame (Figure 1), which is embedded as a small preview graphic in the online notes for the session, appears to differ in its labels from the downloadable file for which the icon provides a link (Figure 2). At the beginning of the first excerpt, which falls at the end of the exchange, Mary is scrutinizing the icon that appears on the screen of Helen's computer, trying to discern from the tiny text how the labels differ.

Exchange 7 (lines 350-410) ⁴

Mary And then in this column is learning challenges? (1a) But that's not that what that says 'thoughts'... (1b) What does that say? (1c)
 [Mary is looking over Helen's shoulder, trying to read the tiny print on the TfU planning frame preview graphic that appears in session notes.]

Ana (laughs). (2)

Helen (laughs) Should I print that frame too? (3)
 [At keyboard, referring to the postage-stamp sized preview graphic displayed on the session notes.]

Mary I guess so. (4a) But I have it as learning challenges. (4b) But that's [//] but I think there are different versions of it? (4c) [Mary moves back to lab bench.] Actually know what... I have it Helen, actually have it right here. (4d) [Mary pulls printed copies of two versions of the planning frame from a packet of papers she has brought along.]

Helen Ok. (5)

Ana (laughs) (6)

Mary I have that one (.) and that one. (7)
 [She displays the two versions of the planning frame that she has printed out, one of which corresponds to the planning frame preview graphic and the other of which corresponds to the downloadable file.]

Ana Does it matter which one we use? (8)

Mary That's what it is. (9a) This is 'targets of difficulty'. (9b) [referring to the text of the preview graphic] Which is really the same thing as 'learning challenges'. (9c)[referring to text of the file they have downloaded]

Ana I don't get it why do they give us like twenty of those! (10)

Mary I don't know. (11a) So let's [?fill in] this one (be)cause that's what this [downloaded file] is. (11b)

Helen (laughs) (12) [rejoins others at lab bench]

Mary So we have a 'generative topics', we have 'understanding goals'... (13)[Mary begins to sort print-outs of previous work into the categories displayed on the planner.]

Ana Oh it's DI [Differentiated Instruction], it's um TFU [Teaching for Understanding] # it's TFU, yeah. (14)

Mary ## Yeah. (15)

Ana Cool. (16)

Helen Oh maybe it's [//] there's one that's in TFU language and one that's in (an)other language? (laughs) (17)

Mary Oh. (18)

Ana (laughs) (19)

Attending to the task first involves sorting out how the team will both literally and figuratively fit their previous work on the unit into the single-page planning frame they have downloaded from the course website. Initial attention hovers around lining up the work they have already done with the categories presented in the planning frame and figuring out the level of detail required because the planning frame does not allow adequate space to include all they have previously produced. However, these instrumental concerns, articulated by Mary, are soon overshadowed by another concern, sorting out discrepancies in the terms used between the different versions of the planning frame they have found. One version of the planning frame adopts language associated with the Differentiated Instruction approach they have been learning and the other adopts language from the general pedagogical framework, Teaching for Understanding, which they have also been using. The tracking/probing moves in this interaction highlight the discrepancies between the two versions.

Tracking/probing moves appear in moves 1a, 4c, and 17. These moves offer up new information while seeking further input from others. For example, move 4c introduces the possibility that the representations of the planning frame are not the same. Mary proposes this with a rising intonation rather than as a declaration, and in so doing, invites others' responses. The first two of these tracking/probing moves are part of longer turns taken by Mary, which define the direction of this interaction (turns 1, 4, 9, 11, and 13). In contrast, Helen's and Ana's turns only comprise single moves. Mary's use of tracking/probing in turns 1 and 4 resembles self-talk (e.g., 1a-c). In a subsequent interview, she made clear that her initial aim was to complete the assignment as quickly as possible. This is clear in her turn 11 when she makes a bid to initiate a new exchange (move 11b, an incomplete opening move), in an effort to focus on the immediate task of sorting their previous work into the categories offered by the frame. Rather than taking up Mary's call to move on, Ana returns to one of the central topics of the exchange, the source of the confusion between planning frames (turn 14). In Helen's

culminating move (move 17, a tracking/probe), Helen both acknowledges Ana's insight and elaborates her earlier joke about the different versions.

Collective **attention** requires the development of a joint perspective on the task at hand. The tracking/probing moves detailed above play an important part in negotiating agreement across a wide variety of mediational means: the text and graphics on a computer screen, images and words printed on paper, and most important to the negotiation of agreement, interaction through spoken words and gestures. The latter allows the group to establish a collective stance towards certain artifacts, treating some as authoritative, such as the version of the planning frame they intend to use, and others as incidental, the version they have decided not to use. In addition, this interaction shapes their orientation to the task. Are they going to treat the activity as an instrumental act of filling in the required form (i.e., minimal compliance) or are they going to make the task their own through seeking to articulate and reconcile areas of confusion (i.e., mutual adaptation or cooptation)?

Interpolation

In exchange 14, the teachers take up an artifact, the Feedback Pyramid, that was introduced in an earlier session to use as a tool for helping in their immediate task of summarizing their unit with the planning frame. The Feedback Pyramid, the "grid" to which Mary and Helen refer below (moves 9 and 10), highlights three dimensions of assessment, including type (formal, informal), form (written, verbal), and source (self, peer, teacher). As they summarize the unit, the team has come to focus in particular on the relationship between the activities they are asking of students (performances of understanding, in TfU terms) and the forms of assessment they intend to use with those activities. The following excerpt from exchange 14 shows the team working through each of the activities they have previously identified for their unit, using the Feedback Pyramid to define the type, form, and source of assessment for the activity.

Exchange 14 (lines 624-667)

Helen And actually in some ways, this is kind of a # like [//]
I'm just kind of thinking about the # ongoing assessment at
the same time...? (1)

Ana Um hm. (2)

Helen That like this dietary analysis seems like something they
would turn in is that...? (3)

Ana Yeah. (4)

Helen Whereas this is a little bit [//] This is almost [//] Oh,
it's not [//] It could be a little bit of like a self-
assessment. (5a) Like there could be [//] It could be a
little bit of a like self reflection about what... (5b)

Ana Um hm. (6)

Mary Yeah. (7)

Helen Like this is sort of a teacher (8)

Mary Right on that grid [Feedback Pyramid] that <that xxx> [>]
(9)

Helen <on the grid> [<]. (10)

Helen So this is like [//] This is like a teacher # teacher-
assessed. (11)

Mary Sort of teacher and kind of informal.(12a) Where this'll be
student informal or something? (12b)

Helen Yeah maybe. (13)

Mary I don't know. (14)

Helen # And maybe it would just be something that they hang on
[//] Like maybe it's not even something that's collected
but that like [//] they like hang on to and look at later.
(15)

Ana Um. (16)

Mary Um hm, right, right. (17)

Helen, as the acknowledged expert in the Teaching for Understanding framework, initiates exchange 14 and establishes a pattern of interaction typical of several subsequent exchanges (exchanges 15 to 22). The pattern consists of Helen teasing out information from Mary, whose disciplinary expertise in biology is central to the unit they have been designing. Employing the conceptual relation in TfU between a performance of understanding and its assessment, Helen uses tracking/probing moves and requests for clarification to determine jointly how the activities will be assessed.

The segment of interaction above falls midway through exchange 14 and begins with Helen's use of a tracking/probing move to elicit a response from others: "I'm just kind of thinking about the ongoing assessment at the same time?" (move 1). Through a series of developing moves, Mary and Helen establish connections between each classroom activity and the ways they or their students will assess performance related to the activity in the classroom.

Mary physically brings the Feedback Pyramid onto the table (“that grid”, move 9), as well as points it out in her speech. Tracking/probing moves reappear (moves 12b, 15) with the introduction of “the grid”. Mary’s use of a tracking/probing move (12b) contributes additional information in a non-assertive way, which is then further elaborated by Helen (move 15). As in preceding exchanges, Ana’s moves are the least assertive of the three; in this excerpt, she is largely silent. When she does speak it is to affirm what others bring up for discussion (moves 2, 4, 6, 8, 16).

The excerpt from exchange 14 shows how the group has shifted from the evaluation of their task, in the form of a critique of the authority of the artifact, to **interpolating** the work that they have already done in light of their new understanding of the task of summarizing their unit. Rather than trying to fit the work that they have done into the descriptors given by the planning frame, they now view the task as identifying and distilling the relationships between activity and assessment within the work. As articulated through interviews, this approach respected the conceptual relations between instructional activities and assessment, a core relationship in both frameworks that was not made explicit in the planning frame. Through their interaction with various representational artifacts, the team has discerned which constraints to consider valid, interpolating the facets of central importance regardless of the way conceptual relations are construed in the planning frame.

Transformation

Exchanges 15 to 22, which are not included in this article, continue along lines similar to that laid out in the excerpt from exchange 14 above. Helen and Mary review each instructional activity in their unit, making use of the Feedback Pyramid to discern how each should be assessed. The interaction takes a distinct turn in exchange 23 when Mary introduces another artifact they have used in their discussions of Teaching for Understanding. This “Staircase of Understanding” showed a way of representing the relationship between activities, which serve as the risers, with assessment, which are the treads, connoting that student understanding should

rise with each subsequent activity, a rise that could be gauged through different forms of assessment. The representation was developed by a teacher-leader within the school who had many years of experience with Teaching for Understanding and who had used the representation in school-wide workshops in which all three had taken part earlier in the year. The staircase metaphor structures the team's interaction as they discursively walk up each riser and tread, reviewing the sequence of activities and assessments from the beginning of the unit to the end. The planning frame that they have been given for their task makes no allowance for this level of close articulation of assessments with activities.

Exchange 23 (lines 1194-1242)

Helen Wait, it's the stair [//] the up part is the thing they do, right? (1a) And then they <just stop and assess> [>]. (1b)
 Mary <There's xx performances> [<] and <ongoing assessment> [>]. (2)
 Helen <So like> [<] this might be the dietary analysis ... (3)
 Ana Oh my gosh we put this chart [the staircase] on there? (4)
 Mary No, no. (5)
 Ana Are you sure? (6)
 Mary (Be)cause xxx. (7a) Yeah we don't have to do it here. (7b)
 It's just I like that visual it just helps me in the beginning with that xxx. (7c)
 Helen I mean I think she'd [online coach] be impressed. (8)
 Mary Yeah we could. (9a)
 I mean if we know how to make a staircase [in the word processing document]! (9b)
 Ana I just I just thought that would be kind of cool. (10)
 Helen And then this would be [//] the ongoing assessment would be... (11)
 Ana The um survey, right? (12a)
 Or "teacher looks to see that students... " [//] [or] "class data chart". [proposing different types of assessment](12b)
 Helen I think it's both of these, right? (13a) The class data chart. (13b)
 Mary Class data chart and um. (14)
 Ana Oh I think I finally actually understand this! (15)
 Helen And then the student [/] the student reflection? (16)
 Mary Yeah. (17)

A variety of tracking moves are important in the elaboration of ideas, subtle shifts in social relations, and the development of the artifact that is meant to represent their work. The first part of exchange 23, preceding the above segment, is one that involves Helen and Mary

continuing to elaborate the links between activities and assessment but doing so not just through the spoken word but with the image of the staircase in front of them. In the above segment of exchange 23, Ana's tracking/probing move 4, "We put this chart on there?", puts forward a new connection for confirmation—that they use the schematic of the staircase as part of the planning frame to represent the relationships they have been working out. As has happened before with Ana's interjections, the initial proposal is rejected by Mary (move 5) but Helen supports the idea with a countering move. Mary concedes in move 9a, which leads to a rapid series of turns in which Ana and Helen elaborate how this might be done, with Mary affirming. Tracking/probing moves (12a, 13a, 16) play an important role in this rapid series of turns. Each contributes a bit of additional information, inviting continued interaction from others with the rejoinder "right?". The pattern of rapid latching on each others' turns, along with the introduction of new information through tracking/probing moves is what marks this sequence as distinct from the preceding series (exchanges 14 to 22), characterized by a back-and-forth between Helen as TfU expert and Mary as subject expert.

In exchange 23 and subsequent exchanges not included in this analysis (exchanges 24 to 36), Ana takes a more active role, employing a wider range of speech functions than in preceding exchanges. Ana is the one to propose that they design their own version of the planning frame, beginning exchange 29 by declaring, "We [//] I think we should make our own graphic organizer for the unit! Put the sun in the middle with the understanding goals just shining brilliantly!" By exchange 33, much of the action has shifted away from spoken interaction to shared annotation of the printed version of the planning frame. The **transformation** highlighted in this series of exchanges involves changing the form of the artifact as well as teachers' positions in relation to one another.

Integration

The final layer in this analysis is that of integration, in which institutionally-derived categories are reconfigured through ongoing action. One example of this occurring towards the

end of the sequence is team discussion of a series of energy transfer labs they had sketched for the end of their planned unit. They have just begun to discuss the labs required, when Ana initiates exchange 37 by telling the others that she has already taught all but one of the labs, which she had never previously mentioned. It is at this point that the others turn to her for more detail about the instructional activities and the forms of assessment she has used.

Exchange 37 (lines 1713-1798)

Ana I did actually almost all of these [labs] except for the enzyme lab. (1)
 Mary That's awesome. (2)
 Mary You did that one # this one. (3a) Did you do the demo? (3b)
 Ana The silo, yeah. (4) [a controlled explosion using lycopodium powder to demonstrate factors contributing to combustion]
 Mary As a demo? (5)
 Ana Yeah. (6)
 Mary What did [//] How did you look for [//] What did you...? (7)
 Ana What did i look for? (8a) Um, we read a story about um like mainly the idea of like energy being able to come from matter. (8b) And also the concept of exothermic versus endothermic # reactions so. (8c)
 Mary Right. (9a) So it could just be looking at students' like journal ... (9b)
 Ana Yeah. (10)
 Mary You'd look at their journal or... (11)
 Ana Oh, like what <did I actually have them do> [>] ? (12)
 Helen <Somewhat informal> [<] ... (13)
 Ana I think I just [//] I had them answer some questions. (14)
 Mary Right yeah. (15)
 Helen Um # so it's almost like a [//] a little bit of a pre-assessment of knowing whether [>] they understand exothermic and endothermic? (16)
 Ana Oh and combustion ... (17)
 Mary It is a little bit yeah. (18)
 Ana We talked about combustion too xxx . (19)
 Helen So like informal ... (20a) So this is "exo # endo # demo" [speaking while writing]? (20b)
 Mary Yep. (21)
 Helen So "informal # assessment of..." [speaking while writing] . (22)
 Ana I [//] and then I directly applied it to that whole calorimetry thing. (23)
 Mary Right exactly. (24)
 Ana Yeah . (25)
 Mary Exactly . (26)
 Helen "informal assessment of" [speaking while writing] ... (27)
 Mary "students' prior knowledge"? (28a) I don't know. (28b)
 Ana xx [speaking while writing] . (29)
 Helen Well that's a chemistry connection! (30)
 Mary Yeah exactly! (31)

Ana I love this unit. (32)

As in the preceding segment from exchange 23, the interaction in this excerpt from exchange 37 is marked by a rapid series of turns in which Helen and Mary elicit details about Ana's teaching of the lab. Tracking/probing moves play a particularly important role at two moments. In turns 16, 20, and 22, Helen uses tracking/probing moves to clarify what form of assessment Ana has used. In her explanation, Ana uses everyday language to describe what she did, e.g. "I had them answer some questions" (move 15). The tracking/probing moves allow Helen to translate this into more technical terms, using the pedagogical term "pre-assessment" and the scientific descriptors "exothermic and endothermic". Here the tracking/probing moves are not only negotiating intersubjective understanding; these moves allow the **integration** of different frames of reference, both pedagogical and disciplinary, that help the teachers elaborate their ideas about the unit within the constraints of the pedagogical frameworks they are using.

Discussion

The use of tracking/probing moves by the two teacher-leaders and the junior teacher in this sequence corresponded with moments of interaction in which the team collectively negotiated its task through interaction with institutionally-defined artifacts. Across the sequence, the aim of that task shifts from Mary's initial emphasis on completing the assignment in a straightforward way towards the transformation of the primary artifact, the planning frame, in a way that aligned with and complicated team members' understandings of the two general pedagogical frameworks that were the foci of instructional reform in their school. The shifts in the team's construction of the task corresponded with the transformation of the institutionally-defined artifact into a collectively-derived tool for curriculum design within the team. For the leaders of reform in the school, the representation developed by the teachers served as an exemplar of a "common language" of pedagogy to rejuvenate the curriculum; the representation also served as an exemplar of best practice in the online course. On the basis of this, the

interaction examined here is taken as an instance of mutual adaptation and not of cooptation, which would entail the misinterpretation of the pedagogical principles underlying the two frameworks.

The preceding analysis used four labels to delineate phases of development across the sequence--attention, interpolation, transformation, and integration. These layers were demarcated by shifts in the dynamics of interaction among the three teachers indicated by variations in the use of tracking/probing moves. In the early phases of attention and interpolation, the elaboration of the artifact rested with the two teacher-leaders, Helen and Mary, whose expertise in Teaching for Understanding and biology, respectively, shaped the elaboration of ideas in relation to their assigned task. Ana, the junior teacher, assumed a subtle, yet important posture in these exchanges as a naïve inquirer, posing indirect challenges to the direction taken by the others through questions and comments (e.g., exchange 7, moves 8 and 10). The teachers initially upheld the legitimacy of the planning frame, treating it as authoritative through their early attempts to reconcile its ways of representing relations between instruction and assessment to their own understanding, based on an artifact they had already used in the online course, the Feedback Pyramid. This last step was the defining feature of the interpolation phase, illustrated in exchange 14. In these early phases, the relationships among person, collective, and institution remain constant both in terms of social position among teachers and the position of the artifact as a source of authoritative knowledge in relation to the team.

In the latter two phases of transformation and integration, the teachers jointly developed a hybrid representation that served, for the collective, as a more accurate portrayal of the relationship between assessment and instructional activities intended by the pedagogical frameworks. Their assumption of ownership of the artifact corresponded with the emergence of the junior-teacher, Ana, who begins to use a wider range of speech moves, indicative of the more assertive stance she takes both in relation to her mastery of the pedagogical frameworks (e.g., exchange 23, move 15: “Oh I think I finally actually understand this!”) as well as her own

assertion of expertise in subject matter teaching, which provides the grist for the team's elaboration of the "staircase" in exchange 37. The shift in these interactional patterns corresponds with the literal break-through made by the team—their transgressing one of the category boundaries represented on the planning frame and inserting their own representation. By the end of the sequence, the team successfully negotiates a way in which each member contributes to the elaboration of ideas, moving from the minimally-compliant intention of simply filling in the planning frame as presented to the mutual adaptation of a hybrid representation. In this instance, tracking/probing moves enabled the collective articulation of the relationship between assessment and instructional activities and the collective re-alignment of their institutionally-defined roles within the interaction.

What began as an institutionally-defined task—to complete the planning frame—becomes one in which the teachers develop a unique representation that articulates the links between assessment and instruction in a way that brings the two frameworks together. Their emerging confidence in the use of the frameworks and their growing sense of ownership of the ideas as applied to their own practice constitute the development of collective agency. These realignments of the relationships among person, collective, and institution mediated by a range of material and conceptual tools illuminate the dynamic processes of mutual adaptation in the enactment of reform.

Findings from the study suggest several implications for practice. A dynamic perspective on the enactment of reform aligns with the body of research and prescriptions for practice that identify the collective as a primary setting for the enactment of reform (Drago-Severson, 2009; McLaughlin & Talbert, 2001; Stoll & Louis, 2007). This implication resonates with recent research that has shown the potential of structured protocols to serve as means of introducing different patterns of interaction into the collective setting (Earl & Timperley, 2008; Gallimore, Ermeling, Saunders, & Goldenberg, 2009; McDonald, Mohr, Dichter, & McDonald, 2007). However, this study emphasizes the need for understanding the ways in which institutionalized

orders of meaning intersect with the realignment of both conceptual and social relationships that substantive change entails. Close and critical attention to institutionally-derived categories embedded within the artifacts of reform hold the promise of supporting teachers' discernment around the espoused aims of reforms and the alignment of those aims with existing practice. Attention to institutionally-derived patterns of interaction within the school highlight possibilities for tracing various alignments among person, collective, and institution.

Conclusion

This detailed analysis of one sequence of interaction sought to explain how collective agency develops when teachers work together with artifacts introduced as part of instructional reform in their school. The findings and discussion point to the importance of the collective as a setting in which reform is enacted. Emphasis on the collective in educational change has been widely promoted and contested in policy, practice, and research. The debate has been cast in contrasting perspectives of programmed, adaptive, or professional approaches. While helpful as framing devices, these perspectives serve as post-hoc rationalizations of the dynamic processes of “back and forth constraining” (Lawrence & Valsiner, 2003) that characterize the enactment of reform. The research reported here has sought to explore the processes of enactment by examining the development of collective agency in an instance of mutual adaptation. The enactment of reform, in this relational view, entails continuous adaptation in which institutionally-defined mastery meshes with the appropriation of institutionally-defined artifacts by the collective. More broadly, the study suggests that the full range of outcomes characterized by Berman & McLaughlin (1975) more than three decades ago—those of rejection, minimal compliance, cooptation, in addition to mutual adaptation—are all potential results from particular alignments of person, collective, and institution in the everyday interactions that constitute professional work in schools.

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Figure 1

Screenshot from Session 6, Assignment 2 of the Differentiated Instruction online course.

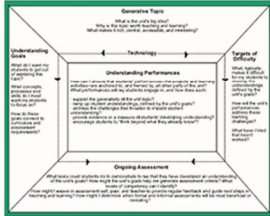
[filename: co_agen_fig1_b]

 **DI Project: Final Copy**
Due: Mon, May 03 Time: 3 hours

2 Due: Tuesday, May 3, 2005 (National Teachers' Day in the USA)
Time: 3 hours
Value: 3 Points

Part 1

Review and reflect on your final project.



Return to the guidelines for the TFU units found in the Overview section. How well are these elements exemplified in your project?

Refer to the [DI Project Guide](#) to thoughtfully assess your project.

Experiment with using the [TFU planning frame](#) to organize and display your unit.

Post the current draft of your project. Let us know some of the next steps you plan to take. Is this ready to share with students? Peers? Parents?

Part 2

Write a letter to introduce your TFU unit to the parents of your students. Include explanations and introductions to the DI and TFU elements which might be unfamiliar to the parents.

OR

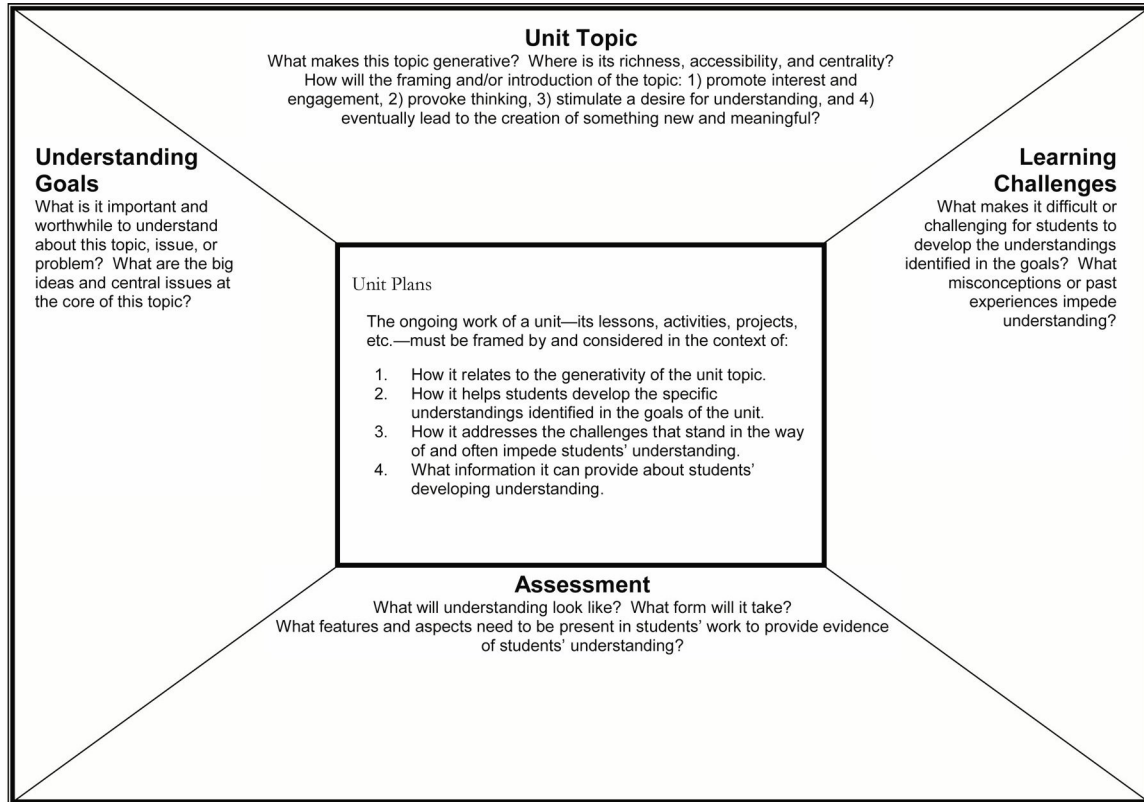
Alternatively, craft a one page text for teaching staff, peers or others to introduce them to the ideas in your project and set the stage for sharing the project with them. Include an overview of your teaching situation, student profile, and other background information which would help online readers.

[reduced resolution version – not for publication]

Figure 2

TfU Planning Frame from Differentiated Instruction online course, Session 6.

[filename: co_agen_fig2_b]

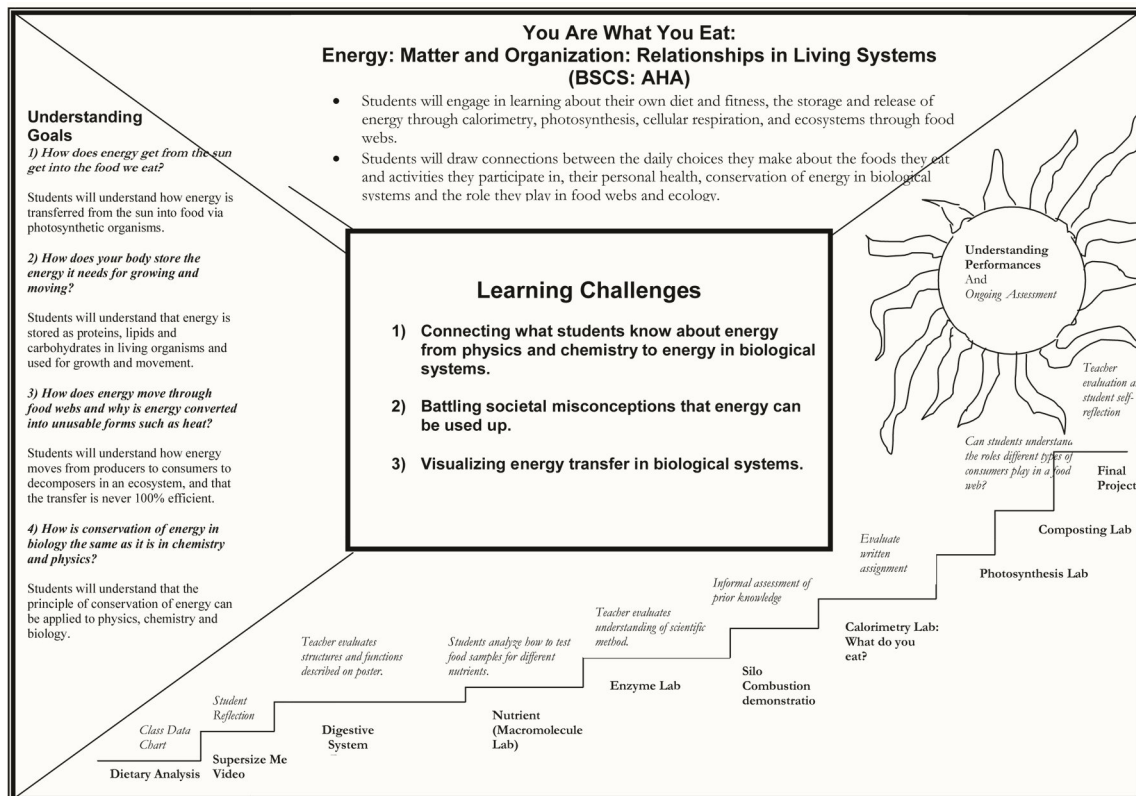


[reduced resolution version – not for publication]

Figure 3

Energy Unit Planning Frame as submitted by Ana, Helen, and Mary for Session 6, Assignment 2 of the Differentiated Instruction online course.

[filename: co_agen_fig3_b]



[reduced resolution version – not for publication]

Endnotes

¹ “Rationale for TfU for L-G,” internal communication, 28 April 2004.

² The codebook and examples of application of the codes are accessible online at <http://go.bath.ac.uk/codebook>.

³ Ibid., p. 240-241.

⁴ The following basic transcription conventions are used in the excerpts:

#	pause between words
##	long pause between words
xxx	unintelligible speech, not treated as a word
xx	unintelligible speech, treated as a word
[?]	unintelligible, preceding word is best guess
[!]	stress
[text]	transcriber comment or local event (e.g., laugh, groan, etc.)
[//]	self-correction
[///]	restart
text(text)text	partial or non-completed word
...	trailing off
<text> [>]	overlapped speech
<text> [<]	overlapping speech
(number)	a turn made up of a single move, e.g., (3), appearing at end of turn
(number letter)	a turn made up of more than one move, e.g., (3a), appearing at end of each move